

Extreme Weather affects Water Mains and Pipes

Water main breaks or leaks are most likely to occur during extreme weather conditions.

Frigid weather is the most common time for water main (or water pipe) breaks and leaks. GCWW gets most of its raw water from the Ohio River. During the winter months, the water in the river can get very cold. It is well documented that, as the system water temperature approaches 40°F, there is an increase in water main breaks and leaks. Below 40°F water main breaks and leaks can greatly increase because the outside of the pipe is at a warmer temperature than the inside of the pipe. As the inside of the pipe contracts relative to the outside of the pipe, stress increases.

Once the temperature of the water in the water mains stabilizes, the water mains adjust to the lower temperatures and breaks and leaks will drop off. However, if temperatures drop more, they will again increase. The faster the water temperature drops, the greater the increase in break and leak activity. Conversely, if water temperatures begin to rise rapidly, there will be an increase in breaks and leaks. So the rate of temperature change is also important. **Both water temperature at or below 40°F and the rate of change of water temperature create greater stress in water mains.**

Cold ambient air temperatures not only cool the water in the river, but also cause the ground to freeze. As the ground freezes, it shifts and moves. This may cause changes in the support that water mains get from the ground beneath and increase the pressure exerted from the ground above. Although pipes are installed below the freeze line, freezing causes shifts in the ground. These external forces exerted on the pipe can result in increases in stress in the pipe.

Hot, dry weather is the second most frequent time for main breaks. During summer months, GCWW pumps about 30 percent more water than in winter. On some very hot days, water pumpage can increase by over 100 percent, compared to cold winter days

The water that leaves our pumping facilities is monitored continuously and maintained within a normal range of operating pressure. However, a greater volume of water is pumped at higher velocities than normal. As the water moves through the pipes at greater velocities it exerts greater forces on the pipes where they change directions, such as where the pipes bend. Also, the increased volume of water moving through pipes during the summer months can “pack up” in the water mains located away from our pumping facilities increasing the pressures inside the pipe. **Both the increased pressure and velocity create greater stress in water mains.**

During hot, dry weather, the ground starts to crack and shrink. **As the ground shifts and settles, it can increase external forces on water mains increasing stress in the pipe.**

During both extremes of weather, the increase in stress from both internal and external forces can increase the number of water main breaks and leaks.

When a water main break is reported, we respond immediately. If it turns out to be a water main **break**, the water main is shut down and an emergency repair crew is dispatched to fix the water main. Water main **leaks**, which are smaller than breaks, are inspected and prioritized. While a leak may not be considered an emergency, we place a high importance on repairing water main leaks. We continuously monitor leaks and our work plans are constantly evaluated.